

Addendum #1

Request for Proposals for Long-Term Lease of Land for Rental Housing Development

Response (s) to Outstanding Question Raised at Pre-Bid Meeting

February 22, 2022

1. **Question:** A question was raised at the pre-bid meeting regarding connection fees to the public water system, how much the fees were and whether these fees would be impacted by future cooperation between Dunstable and Pepperell regarding the operation of the system.

Response: Dunstable Water Department maintains a schedule of fees and rates. In this situation the connection fees would fall under Section II.A. of the rate schedule called System Development Fees. The rate schedule is attached. The amount of the fee is driven by the size of the pipe in the proposed development. For instance, if the household will be served by a 1" main, then the fee would be \$4,000 plus the cost of the meter and an installation fee. The base fee is fixed while the meter cost will reflect the actual cost at the equipment at the time of installation. This is Dunstable's fee structure, while Pepperell water department has assumed responsibility for the operation of the system, Dunstable's fees will remain in place for the foreseeable future.

The Board of Water Commissioner's is willing to consider a lump sum fee in lieu of the fee schedule fees in the context of considering all the financial implications of the Town accepting a proposal for the development of this housing on public land. This would be evaluated alongside proposed lease rates, tax revenues, utility revenues, and any other financial assistance requested by the selected developer at the local level. The lump sum fee could be negotiated alongside the other financial considerations of the project in cooperation with the Board of Selectmen.

TOWN OF DUNSTABLE

BOARD OF WATER COMMISSIONERS (BOW)

Dunstable, MA



SCHEDULE OF RATES AND FEES

EFFECTIVE WITH THE MAY 2019 BILLING

I. RATES & FEES

- I.A. Meters are read semi-annually, and bills are rendered semi-annually. All water takers will be charged at least the minimum rate per billing period with no exceptions made for seasonal or temporary discontinuance of water service.
- I.B. All bills are due and payable within 30 days and over due bills are subject to a 1.17 % late charge. Water may be shut off for non-payment of bills or disregard of rules. Before water is turned back on, the delinquent bill, interest, plus an additional service charge for turning the water off and on, must be paid. Unpaid water bills constitute a lien on real estate and collection of committed accounts may be made by the Town through the sale of property (Section 42A to 42I inclusive of Chapter 40 of the General Laws).
- I.C. Where two or more tenants or occupants are supplied on the same premise, the water may be shut off for failure of a tenant or occupant to comply with the billing rules and regulations even though one or more of the tenants or occupants have made settlement for his share of the total amount.
- I.D. **Water Rates:**
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| I.D.1. Service charge per billing period | \$60.00/ Account |
| I.D.2. Minimum Rate up to 10,000 Gallons | \$126.00 |
| I.D.3. 10,001 Gallons to 20,000 Gallons | \$0.0146 / Gallon |
| I.D.4. Over 20,000 Gallons | \$0.0160 / Gallon |
| I.D.5. Bulk Water Rate ** | \$0.035 / Gallon + DWD |
- Department Supervision charge of \$42.50 per hour
 **Contact DWD to set up date/time for this service.
- I.E. **Processing Fee, Unpaid Bills:** In addition to any charges incurred pursuant to Section I.B., above, the BOW may impose a processing fee for overdue payment notices, consisting of \$50.00, plus any costs incurred for certified mail or service by constable. Any such charge shall be added to the account and be subject to lien process under Chapter 40 of the General Laws.

II. OTHER STANDARD FEES

II.A. System Development Fee:

PIPE SIZE	APP/CON FEE	PIPE SIZE	APP/CON FEE
1"	\$4,000 + meter cost + installation/administration fee	4"	\$16,000 + meter cost + installation/administration fee
1-1/2"	\$6,000 + meter cost + installation/administration fee	6"	\$24,000 + meter cost + installation/administration fee
2"	\$8,000+ meter cost + installation/administration fee	8"	\$32,000+ meter cost + installation/administration fee
3"	\$12,000+ meter cost + installation/administration fee		

TOWN OF DUNSTABLE
BOARD OF WATER COMMISSIONERS (BOW)

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SCHEDULE OF RATES AND FEES

EFFECTIVE WITH THE MAY 2019 BILLING

II.B. Tapping Charge:

$\frac{3}{4}$ " to 1 " Charge by contractor

II.C. Inspection, Supervision Charge:

II.C.1. By DWD employees: @ \$50.00 P/H

II.C.2. By Engineer: @ Invoiced amount

II.D. Shut Off Charge: \$ 100.00

II.E. Turn On Charge: \$ 100.00

II.F. Final Reading: \$ 50.00

II.G. Fire Flow Test: \$ 100.00

II.H. Special Meter Reading: \$ 50.00

II.I. Stand-By Fee: \$ 80.00

II.J. Hydrant Replacement: Invoiced amount – Labor & Materials

II.K. Freeze-Ups: DWD Supt supervision @ \$50.00 P/H +
materials & contractor time/labor

II.L. Interest Rate: 1.17 % per month after 30 days

II.M. Large Meter Maintenance: (Over 1" size) tested and repaired every five
(5) years with DWD materials at customer expense
(at the prevailing rates).

II.N. Small Meter Maintenance: (1" size and smaller) tested and repaired
every ten (10) years at DWD expense (at the
prevailing rates).

II.O. Back Flow Tests: Performed twice a year \$125.00 per device

II.P. No person shall turn on, shut off or tamper with, including but not limited to water
mains, hydrants, meters, or any component of the water system. Person(s) found
violating this policy will be subject to a fine of \$500.00 per offense.

IV.N.2. Bedding:

IV.N.2.1. Class “1” Bedding: Class “1” bedding materials are materials on the site, earth bedding.

IV.N.2.2. Class “2” Bedding: Class “2” bedding materials shall be composed of gravel materials. Gravel bedding materials shall be pea gravel or washed gravel no larger ½” diameter. Substitution of alternate bedding materials will be approved only in individual cases and only at the specific request of the engineer.

IV.N.2.3. Class “3” and Class “4” Bedding: Class “3” and Class “4” bedding materials shall be composed of concrete and reinforcing steel. All concrete used for Class “3” and Class “4” bedding shall be 2,000 lb. concrete.

IV.N.3. Backfill

IV.N.3.1. Standard backfilling shall be done with good earth, sand or gravel and shall be free from large rocks or hard lumpy material, unless the rocks or lumps are not more than approximately four (4) inches in greatest diameter and are scattered in the soil. No material of a perishable, spongy, or otherwise unsuitable nature shall be used in backfilling.

IV.N.3.2. Granular Backfill: Shall conform to the following:

<u>Sieve Designation</u>	<u>Percent Passing</u>
½ inch	50 – 85
No. 4	40 – 75
No. 50	8 – 28
No. 200	0 – 10

With maximum stone size one (1) inch.

IV.N.3.3. Controlled Density Fill. Controlled Density Fill (CDF) material is a flowable, self-consolidating, rigid setting, low density material that can substitute for compacted gravel for backfills, fills and structural fills. There are two main categories of CDF’s, excavatable and non-excavatable with a subcategory of flowable and very flowable. It shall be a mixture of portland cement, flyash (if very flowable), sand and water designed to provide strengths within the range specified.

IV.N.3.3.1. The categories of CDF's are:

- Type 1 Very Flowable (Non-Excavatable)
- Type 1E Very Flowable (Excavatable)
- Type 2 Flowable (Non-Excavatable)
- Type 2E Flowable (Excavatable)

The Very Flowable mixes (Type 1 and 1E) shall contain a minimum of 230 pounds of Class F Fly Ash or high air (25% plus) and will be self-leveling. Excavatable mixes (Type 1E and 2E) shall be hand tool excavatable.

Type 1 mixes are intended for permanent installations such as structural fills under structures. It has very flowable characteristics needed for distances and small areas. This type of mix should not be used as a bedding material. It is used to fill small hard-to-reach areas.

Type 1E mixes are excavatable material designed to have very flowable characteristics needed for filling small or far areas that later may need to be removed.

Type 2 mixes are used in areas where size and distance do not need the very flowable characteristic. It is intended for permanent installations such as thick fills under structures.

Type 2E mixes are excavatable mixes where size and distance of the installation do not require the flowable characteristics of a Type 1E mix.

IV.N.3.3.2. CDF is to be batched at a ready mix plant and is to be used at a high or very high slump of approximately 10 inches to 12 inches. It shall be flowable, require no vibration and after it has been placed can, for Types 1E and 2E, be excavatable by hand tools and/or small machines.

The ingredients shall comply with the following:

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| • Portland Cement | AASHTO M 85 |
| • Fly Ash | AASHTO M 295 Class F |
| • Sand | M4.02.02 Mass Highway
DEOT Specs. |
| • Air Entraining
Admixtures | M4.02.05 Mass Highway
DEOT Specs. |

IV.N.3.3.2.1. In lieu of the slump test, a 6-inch long, 3" diameter tube may be filled to the top and then slowly raised. The diameter of the resulting "pancake" may be measured and the range of the diameter shall be 9 inches to 14 inches.

IV.N.3.3.2.2. The maximum strength for structural flowable fills may be expressed in increments of 100 psf and will depend on the engineer's requirements.

IV.N.3.3.2.3. High air (25% plus) may be used instead of fly ash with an adjustment in sand content.

IV.O. Tape:

IV.O.1. Detectable Tracer Tape: The tape shall be a minimum of three (3") inches wide. The upper face of the tape shall be of a highly visible color easily detectable when exposed by digging. The upper face shall carry the warning of the buried water main below. The tape shall have a metallic backing in order that it may be traced by metal or pipe locators. It shall be used over all non-metallic pipes.

V. CONSTRUCTION

V.A. General: This part of the specification shall govern the construction procedures used in the installation of water line facilities under the jurisdiction of the BWC. Complete specifications covering any unusual or special construction procedures shall be submitted for approval and approval must be received prior to beginning any construction operations.

V.B. Excavation: This section covers the excavation of water lines, and appurtenances.

V.B.1. Trench Excavation:

V.B.1.1. The sides of the excavation shall be cut at such a slope that will prevent caving. In areas where soil conditions permit normal excavation of the trench, the sides shall be cut as nearly vertical as possible from the bottom of the trench to a point twelve (12") inches above the top of the pipe when it is laid to grade. Maximum and minimum widths of the trench shall be as shown in the plans.

V.B.1.2. In caving ground or in wet, saturated, or flowing materials, the sides of the excavation shall be adequately sheeted and braced so as to maintain the excavation free from slides or cave-ins and safe for

workmen. Sheeting and shoring shall not be removed until the excavation has been backfilled to a sufficient depth to prevent caving.

V.B.1.3. The trench width from the bottom of the trench to an elevation twelve (12") inches above the top of the pipe shall not exceed the maximum width as specified in the plans.

V.B.2. Trench Bottom: The entire length of the water line shall be founded on bedding specified in Section Pipe Bedding and in Section Pipe Bedding and Backfill Materials.

V.B.3. Excavation for Fire Hydrants: Excavation for fire hydrants shall be as specified in Section Fire Hydrants.

V.B.4. Disposal of Excavated Materials: Excavated material shall be piled adjacent to the work to be used for backfilling as required. Excavated materials which are unsuitable for backfilling and excess material shall be disposed of in a manner approved by the engineer.

V.B.5. Use of Explosives: In the event the use of explosives is necessary for the efficient prosecution of the work, the contractor shall notify the engineer in advance of their use and shall exercise every precaution to prevent damage to adjoining improvements or property by reason of their use. Any damage to private property resulting from the use of explosives shall be the liability of the contractor. In all cases where the explosives are necessary, a permit from the Fire Department shall be obtained prior to their use.

V.C. Backfilling: This section covers backfilling of water lines and appurtenances.

V.C.1. Water Lines:

V.C.1.1. Backfilling of water lines shall include the refilling and consolidation of the fill in the excavation up to the surrounding ground surface or road grade at crossings. It is essential that the complete backfill be done in such a manner to minimize voids in the backfill.

V.C.1.2. Backfilling up to a point twelve (12") inches above the top of the pipe shall be done with granular backfill material and shall be free from large rocks or hard lumpy materials over one (1") inch in size. No materials of perishable, spongy, or otherwise unsuitable nature shall be used in backfilling.

V.C.1.3. Pipe shall be backfilled with granular materials of the proper moisture content to obtain a support under the lower ½ of the pipe, compacted to a density of 95% AASHTO T-99 modified or better. The intent is to cradle the pipe so that the full length of each joint is uniformly supported on firm bedding and the weight of pipe and fill is borne uniformly by the lower ½ of the pipe barrel. Tamping of fill below the spring line of the pipe may be by hand tamps provided the required density is obtained.

V.C.1.4. Where trenches are not under existing or proposed paved areas, backfill shall proceed with the same granular materials hand placed to a point twelve (12") inches over the top of the pipe. Backfill may then proceed by whatever commonly used construction methods as are consistent with the integrity of the pipeline. Backfill outside the existing or proposed paved areas shall be left slightly over full to allow for settlement.

V.C.1.5. Where trenches are under existing or proposed paved areas, the entire trench up to a point two (2) feet below existing or proposed subgrade shall be backfilled with granular materials and compacted to a density of 95% AASHTO T-99 modified or better

The backfill of materials in trenches under existing or proposed paved areas shall be compacted with mechanical devices manufactured for that purpose from two feet above the top of the pipe to the top of the existing or proposed subgrade.

V.C.2. Fire Hydrants:

V.C.2.1. Backfilling of fire hydrants is specified in Section V.H. - CONSTRUCTION – Fire Hydrants.

V.A. Installation:

This section covers construction methods for pipe installation. All pipe shall be laid on either Class "2", Class "3", or Class "4" bedding materials as specified in Section IV.N.2, "Bedding", except that ductile iron pipe conforming to Section IV.B, "Ductile Iron Pressure Pipe of these specifications may be bedded as specified for "Type 1" laying conditions in ANSI A21.50, "Thickness Design of Ductile Pipe," latest revision, unless structural or foundation requirements indicate otherwise.

V.A.1. Class "1" Bedding:

- V.A.1.1. Class "1" bedding shall be completed in accordance with details shown on the standard details and with these specifications.
- V.A.1.2. The pipe shall be embedded in the bottom of the trench as shown on the standard details, with cuts made for the bells of the pipe.

V.A.2. Class "2" Bedding:

- V.A.2.1. Class "2" bedding shall be completed in accordance with details shown on the standard details and with these specifications.
- V.A.2.2. Excavation shall be carried to a depth of 0.4 feet below the bottom of the pipe. Where excavation is carried below this depth for any reason, the space shall be filled with Class "2" bedding material unless otherwise approved.
- V.A.2.3. The pipe and joints shall be embedded in the gravel or sand bedding material to a depth of 0.1 feet of the outside diameter of the pipe or to a minimum depth of 0.2 feet as shown on the standard details.

V.A.3. Class "3" and Class "4" Bedding:

- V.A.3.1. Class "3" and Class "4" bedding shall be completed in accordance with details shown on the standard details and with these specifications.
- V.A.3.2. Excavation shall be carried to the bottom of the concrete as shown on the standard details. Where excavation is carried to a depth below the bottom of the concrete for any reason, the space may be filled with either Class "2", Class "3", or Class "4" bedding material unless otherwise approved.
- V.A.3.3. Where Class "3" or Class "4" bedding is used, the pipe and pipe joints shall be embedded in the concrete as shown on the standard details.

V.A.4. Pipe Handling and Cutting:

- V.A.4.1. If authorized, cutting of the pipe shall be done so that the cut is square and clean, without causing damage to the pipe lining. Unless otherwise authorized by the BWC, all pipe cutting shall be done by means of an approved type of power cutter. The use of hammer and chisel, or any other method that results in rough edges, chips and damaged pipe, is prohibited. All cut edges shall be field beveled by use of a power grinder, as required, prior to installation.

- V.A.4.2. Each pipe section shall be placed into position in the trench in such manner and by such means required to cause no damage to the pipe, person or to property.
- V.A.4.3. The Contractor shall furnish slings, straps and/or approved devices to provide satisfactory support of the pipe when it is lifted. Transportation from delivery areas to the trench shall be restricted to operations that can cause no damage to the pipe units.
- V.A.4.4. Pipe shall not be dropped from trucks onto the ground or into the trench.
- V.A.4.5. The Contractor shall have on the job site, with each laying crew, all the proper tools to handle and cut the pipe.
- V.A.4.6. Damaged pipe coating and/or lining shall be restored before installation only as approved or directed by the BWC.

V.A.5. Service Lines:

- V.A.5.1. The bedding service lines shall meet with the requirements of Class "1" bedding set forth above.

V.B. Pipe Laying:

- V.B.1. Inspection: Each joint of pipe shall be inspected carefully before being placed in the trench. Any joint found to be cracked or otherwise so damaged as to impair its usefulness shall be plainly marked in such a manner that the marking will not rub or wash off. Damaged joints shall be removed from the site as soon as feasible.

V.B.2. Pipe Laying:

- V.B.2.1. All pipe and fittings shall be installed to the line and grade as detailed on the plans. Subject to the approval of the BWC, other fittings may be added to or substituted for those shown on the plans, should the need arise during construction. This permissive stipulation in no way shall relieve the Contractor of the responsibility for furnishing and installing all fittings required for a complete and proper installation of main as detailed on the plans.
- V.B.2.2. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe be laid in water and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Full responsibility for the diversion of drainage and

for dewatering of trenches during construction shall be borne by the contractor.

- V.B.2.3. All dirt and other foreign matter shall be removed from the inside of pipe and fittings before they are lowered into the trench. They shall be kept clean during and after laying, care shall be taken to keep dirt out of the jointing space.
- V.B.2.4. Spigot and bells shall be cleaned thoroughly before the application of lubricant and attachment of the gasket shall be in strict accord with the joint.
- V.B.2.5. At the end of each days work, and when pipe laying is discontinued for an appreciable period, open ends of pipe shall be closed with a cast plug or cap firmly secured in place.
- V.B.2.6. Pipe shall not be placed in the trench without excavating for bells so that the entire barrel of the pipe is uniformly supported on the pipe bedding.
- V.B.2.7. Pipe shall be supported to proper line and grade, and secured against upheaval or floating during the placement of bedding.
- V.B.2.8. All pipe and fittings shall be lowered carefully into the trench in such manner as to prevent damage to pipe, fittings, or linings. Neither pipe nor fittings shall be dropped or dumped into the trench.
- V.B.2.9. Cutting of pipe, where needed, shall be done in a neat and workmanlike manner without damage to pipe or pipe lining.
- V.B.2.10. Unless otherwise directed by the BWC, pipe shall be laid with bell ends facing in the direction of laying. For lines on an appreciable slope, bells shall, at the direction of the BWC, face upgrade. Wherever necessary to deflect pipe from a straight line in either the horizontal or vertical plane, to avoid obstructions, or for other allowable reasons, the degree of deflection at any joining shall be not greater than that which will provide adequate gasket space entirely around the spigot end of pipe
- V.B.2.11. Deflections shall not exceed the maximum recommended by the pipe manufacturer.
- V.B.2.12. All non-metallic pipes shall have trace wire meeting requirements of Section IV.O.1, "Detectable Tracer Tape" of these specifications.

V.B.3. Service Lines:

- V.B.3.1. Copper: Trench bottom shall be free from rocks and other sharp objects. The trench shall be five (5) feet deep as a minimum. Copper service line shall be laid from corporation stop to meter location in trench sufficient to clear paving grades. Care shall be exercised to maintain the line free of dirt and foreign mater at all times. Copper line shall be made up in an entirely slack position and shall be free of kinks. Bends shall be no greater than the originally found in the coil of tubing as packaged. For one and one half (1-1/2") inch & two (2") inch copper shipped in straight length, use the following Bend-Criteria. For two (2") inch copper tubing, a minimum of 45° Bend may be accomplished in a four (4) foot Section. For one and one half (1-1/2") inch copper, 45° bend in a three (3) foot section.
- V.B.3.2. Polybutylene (PB): Trench bottom shall be free of rocks or sharp objects and should be compacted to prevent settlement. Depth of Service Line should be five (5) feet unless otherwise specified on plans or directed by the BWC. Before installation, pipe should be inspected for cuts, punctures or excessive abrasion.
- V.B.3.3. Pipe should be blown out before final connections are make to eliminate any dirt or sand that may have entered the pipe during installation. Pipe shall be pressure tested before being fully backfilled, (partial backfill to hold the pipe in place).
- V.B.3.4. Early Warning Tape: Early warning tape shall be installed in trench, eighteen (18") inches below ground surface for all pipe.

V.C. Fittings:

- V.C.1. Description: This section covers the construction methods for fittings used in water line construction. All materials shall conform to the requirements of Section IV.E – MATERIALS - Fittings. Where mechanical joint fittings are to be used, bolts shall be protected from the concrete blocking by wrapping the fitting with clear plastic.
- V.C.2. Ductile Iron Pipe: Fittings for ductile iron pipe shall meet with the requirements of Section IV.E.2 - "Fittings for Ductile Iron Pipe" of these specifications. Fittings shall be installed as per Section V.E.2 - "Pipe Laying".
- V.C.3. Polyvinyl Chloride (PVC) Pressure Pipe: Fittings for PVC pressure pipe shall meet with requirements of Section IV.E.2 - "Fittings for PVC

Pressure Pipe” of these specifications. Fittings shall be installed as per Section V.E.2 - “Pipe Laying”.

V.D. Taps:

V.D.1. Service Taps:

- V.D.1.1. General: Taps and/or tap assemblies of the specified size shall be installed in locations as detailed and indicated on the plans or as specified.
- V.D.1.2. Taps: Taps for transmission of water or air from the main into system service accessories are defined as follows:
 - V.D.1.2.1. Standard internal pipe threaded holes in the wall of water mains; these taps may be either manufactured into the pipe or installed in the field.
 - V.D.1.2.2. Tap installations that are made by clamping a bronze service clamp equipped with a sealed threaded port on the periphery of the main then drilling through the pipe wall to complete each service port.
 - V.D.1.2.3. When a direct tap is made, pipe dope or Teflon tape shall be applied to the threaded part of the corporation stop.
 - V.D.1.2.4. Services will only be provided from dedicated easements, alleys and right-of-ways.
 - V.D.1.2.5. BWC shall determine the location of taps.
 - V.D.1.2.6. Taps will be located in such a manner to provide the shortest distance to the meter.
- V.D.1.3. Tapping Asbestos-Cement Pipe: Asbestos-cement pipe shall be tapped by the use of a tapping saddle made of brass or stainless steel as in Section IV.F above.
- V.D.1.4. Tapping Cast Iron Pipe: Cast iron pipe four (4) inches in diameter and smaller shall be tapped by the use of a tapping saddle made of brass or stainless steel as in Section IV.F above.
- V.D.1.5. Tapping Ductile Iron Pipe: Ductile Iron Pipe shall be tapped the same as cast iron pipe.

V.D.1.6. Tapping PVC Pipe: PVC pipe shall be tapped the same as cast iron pipe.

V.D.2. Main Taps:

V.D.2.1. Wet Taps: Wet connections shall be used for all connections except where directed by the BWC. Wet connections shall be made with a tapping sleeve and valve conforming to Section IV.J – “Tapping Valves and Sleeves” of these specifications, whether air driven or manual tapping machines are used. The pipe to be tapped shall be cleaned thoroughly and wire brushed to remove rust and other foreign matter. The tapping sleeve shall be shut and tightened down securely. The valve shall be put on the sleeve and braced against movement. Then the tap shall be made.

V.D.2.2. Dry Taps: Dry connections shall only be made when directed by the Engineer and/or when a fitting must be added to an existing line. For dry connections the existing line must be shut off and drained. This should be done so that down time of the line shall be as short as possible. After line has been drained, the line shall be cut and the fitting put in and blocked. The section of line cut into shall be tested and sterilized, as would a new line.

V.E. Fire Hydrants:

V.E.1. Description: This section covers construction methods used in setting fire hydrants. All fire hydrants shall conform to Section IV.G - “Fire Hydrants”.

V.E.2. Excavation: Excavation for fire hydrants shall be neat and shall leave back of trench and bottom of trench undisturbed earth for concrete blocking.

V.E.3. Installation: Fire hydrants shall be installed as per standard details. A standard six-inch gate valve shall be between the main and the hydrant, as per standard details. Six (6) inch cast or ductile iron water line, meeting the requirements of these specifications, shall be used to install fire hydrants.

V.E.4. Backfill: Backfill shall be as per standard details. Concrete blocking shall be put underneath and behind hydrant. At least seven (7) cubic feet of crushed stone, average $\frac{3}{4}$ inch in diameter, shall be placed around hydrant as per standard details for drainage of hydrant barrel.

V.F. Valves:

- V.F.1. Description: This section covers construction methods used for putting in valves. All valves shall conform to Section IV.H - "Valves".
- V.F.2. Bedding: Valves shall be bedded the same as the pipe on which the valve is installed.
- V.F.3. Backfill: Valves shall be bedded the same as the pipe on which the valve is installed.
- V.F.4. Vertical Valves: Valves shall come with an adjustable cast iron valve box, for vertical valves. Backfill for valves shall be compacted as per Section V.C.1 - "Water Lines". Valve boxes shall be installed plumb centered on the valve nut and to proposed grade.
- V.F.5. Horizontal Valves: Horizontal valves shall be installed inside a standard water tight precast concrete manhole. All horizontal valves shall have a by-pass valve as per Section IV.H - "Valves" of these specifications. By-pass valves shall be installed as per the plans and specifications and Section V.I.4 - "Vertical Valves" above.

V.F.6. Air Valves:

- V.F.6.1. General: The term Air Release Valve as used in this section shall apply to the installation of both air release valves and combination air and vacuum release valves. Manholes as per standard details shall be furnished as an integral part of either air release valve or combination air and vacuum release valve installations.

V.G. Meters:

- V.G.1. Description: Services will only be provided from dedicated easements, and right-of-ways. The BWC shall determine the location and size of all meters. Meters shall be located in such a manner to provide the shortest length of service line required as long as the main is not overloaded. The meter will not be in a location that will hinder the maintenance or could cause damage to meter.
- V.G.2. Meters and Fittings: Meters shall conform to Section IV.N - "Meters" of these specifications and shall be set by the BWC. Fittings shall conform to Section IV.F - "Brass Stops, Cocks, and Fittings for Water Works Service" of these specifications.

V.H. Pavement Repairs:

- V.H.1. Description: This section covers the construction methods to be used in the repair of roads, streets, or other public rights-of-way.

V.H.2. Permanent Repairs:

- V.H.2.1. Asphaltic concrete hot mix surface course construction shall meet with the current requirements of the Dunstable Board of Road Commissioners or Mass Highway Department. Specifications for the construction of asphaltic concrete hot mix surface course or as otherwise approved.
- V.H.2.2. Gravel surfacing shall meet with the current requirements of the Dunstable Highway Commission for the construction of crushed stone base courses.
- V.H.2.3. All permanent repairs of streets, roads, or other public rights-of-way shall meet with the construction requirements of the governing agency or private owner and shall meet with the requirements of all local By-Laws, Regulations, Permits, or Codes governing the repairs to roads, streets, or other rights-of-way.

V.H.3. Temporary Surfacing: Methods of temporary surfacing shall meet with the requirements of Section V.K.2.2 above or as otherwise approved to adequately maintain traffic and proper drainage.

V.I. Disinfection:

V.I.1. Description: This section covers methods for disinfection of water lines and facilities. Before water lines are sterilized they must first be pressure tested according to the requirements of Section VI.- TESTING of these specifications. Water lines also must be flushed to remove dirt and other foreign matter.

V.I.2. Disinfection:

- V.I.2.1. After satisfactory pressure and leakage tests have been made, before placing the newly laid mains in service, and when directed by the BWC, the Contractor shall disinfect the main by chlorination.
- V.I.2.2. Prior to chlorination, the mains shall be flushed to remove dirt and other foreign substances.
- V.I.2.3. The mains shall be disinfected by the Contractor under the supervision of the BWC. The Contractor shall use a manually controlled, vacuum type solution feed chlorinator using a mixture of water and an approved chlorine-bearing compound of known chlorine content, such as calcium hypochlorite. The chlorine shall

be introduced into the main through a $\frac{3}{4}$ inch corporation stop installed approximately one foot up-stream from the valve at the beginning of the job and shall be tested for residual chlorine at $\frac{3}{4}$ inch corporation stop installed approximately one foot from the downstream valve at the end of the project.

- V.I.2.4. Water from an approved source shall be introduced slowly into the main during the application of chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the chlorine dose entering the mains shall be at least 50 parts per million. When the pipeline has been completely filled with treated water, the main shall be sealed off. Treated water shall be retained in the main for a period of at least twenty-four (24) hours. At the end of the retention period, the chlorine residual at the extremities of the pipe and at other representative points shall be at least 5 parts per million.
- V.I.2.5. Should the first treatment fail to meet the above requirements, the procedure shall be repeated until tests show that, in the opinion of the BWC, effective disinfection has been accomplished. The water shall then be flushed from the main and the main filled with potable water from the system.

VI. TESTING

VI.A. General: This part of the specifications stipulates test requirements for materials, construction methods, and leakage, pressure and bacteriological tests of the water lines. Testing for materials and construction methods shall be at the Developer's option except as stipulated herein. The BWC may require tests as outlined in these specifications for materials and construction procedures if, in the opinion of the BWC, the quality of materials and the construction procedures do not meet the requirements stipulated herein.

In all cases, leakage, pressure and bacteriological tests shall be performed on water lines as specified in these standard specifications.

VI.B. Testing:

- VI.B.1. The Contractor shall furnish all labor, pumps, taps, chemicals, and other necessary equipment to conduct hydrostatic pressure tests and measured leakage test; and to disinfect thoroughly the mains laid under this contract in accordance with Section 4 AWWA C600-82- Installation of Ductile Iron Water Main.

VI.B.2. The tests and disinfection shall be conducted at a time specified by and under the supervision and direction of the BWC who shall judge the success or failure of the work to meet the required standards.

VI.B.3. In the event that the work fails to meet the required standards as stated herein, the Contractor shall perform such excavation, repair, relaying of pipe, rechlorinating, and all other work necessary to correct the work; and shall repeat the tests or chlorination as often as may be necessary and until such time as the required standards are met.

VI.C. Pressure Tests:

VI.C.1. Before applying the specified test pressure, all air shall be expelled from the pipe. If suitable means of expelling air are not available at high places, the Contractor shall make all the necessary taps as the BWC may direct. After the tests have been completed, the corporation stops shall be left in place or removed and plugs inserted, as directed by the BWC

VI.C.2. The newly laid pipe shall be tested in valved or plugged sections as determined by the District in the field. Water shall be slowly introduced into the section being tested by means of an approved power-driven high pressure test pump.

VI.C.3. The new laid pipeline shall be tested to a pressure equal to 150% of the maximum static pressure for the section being tested corrected to the elevation of the test gauge. If the static pressure of any newly laid section of pipeline being tested is less than 100 PSIG measured at the lowest point of the pipeline section, then the minimum test pressure shall be 150 PSIG.

VI.C.4. The pressure shall be raised to the test pressure required for each section being tested as determined by the BWC. When the test pressure is reached, the time shall be recorded and the test shall begin. The duration of each pressure test shall be a minimum of two hours. During the test, pressure shall be maintained in the section of pipeline being tested by means of a recirculating bypass type test pump. Water shall be added in measured amounts from a container of known volume if required to maintain pressure. The addition of excessive amounts of water shall constitute immediate test failure. The BWC will approve all gauges and test equipment.

VI.C.5. During the test, the line will be examined by the BWC for visible leaks and breaks. Any defects in the works shall be repaired, and any defective materials shall be removed and replaced by the Contractor as and where directed by the BWC.

VI.D. Leakage Test:

VI.D.1. Method of Testing: The leakage test shall be conducted concurrently with the pressure test. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 P.S.I. of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

VI.D.2. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = SD\sqrt{P/133,200}$$

In which L is the allowable leakage, in gallons per hour; S is the length of pipe tested, in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge.

VI.D.3. Allowable leakage at various pressures is shown in the following table;
Table 2 – Allowable Leakage Rates.

Table 2 – ALLOWABLE LEAKAGE RATES

VI.D.4. Allowable Leakage Per 1000 ft. (305 m) of Pipeline “– gph”*

VI.D.5.

Avg. Test Pressure psi (Bar)	6	8	10	12	14	16	18	20	24	30	36
450 (31)	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73
400 (28)	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3	3.6	4.5	5.41
350 (24)	0.84	1.12	1.4	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06
300 (21)	0.78	1.04	1.3	1.56	1.82	2.08	2.34	2.6	3.12	3.9	4.68
275 (19)	0.75	1	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48
250 (17)	0.71	0.95	1.19	1.42	1.66	1.9	2.14	2.37	2.85	3.56	4.27
225 (16)	0.68	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.7	3.38	4.05
200 (14)	0.64	0.85	1.06	1.28	1.48	1.7	1.91	2.12	2.55	3.19	3.82
175 (12)	0.59	0.8	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58
150 (10)	0.55	0.74	0.92	1.1	1.29	1.47	1.66	1.84	2.21	2.76	3.31
125 (9)	0.5	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02
100 (7)	0.45	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.8	2.25	2.7

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

VI.D.6. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/h/in. of nominal valve size shall be allowed.

VI.D.7. When hydrants are in the test section, the test shall be made against the closed hydrant.

VI.D.8. Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than that specified, the Contractor shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance.

VI.D.9. All visible leaks are to be repaired regardless of the amount of leakage. At the end of the test periods if the amount of water added to the main from the calibrated vessel is less than the allowable leakage, and if the line shows no visible leaks or other failures, that portion of the main tested will be approved by the BWC.

VI.E. Testing of Valves and Hydrants:

VI.E.1. All valves and hydrants shall be pressure tested during the main pipeline test. Hydrant gate valves shall remain open during the main pressure test. After the pipeline has been pressure tested and accepted the hydrant gate valve shall be closed and the hydrant valve cracked open to release some pressure on the hydrant side of the gate valve. An acceptable test for each hydrant gate valve shall be no loss of pressure in the main line test pressure as each valve is closed.

VI.E.2. All main line butterfly or gate valves and control valves on any intersecting side streets shall also be tested by the same procedures outlined above as far as practical. The BWC shall decide if it is impractical to test any one particular valve location. No pressure test shall be considered acceptable until all possible control valves have been tested to insure proper closing and water tightness.

VI.E.3. The Contractor shall make any taps and furnish all necessary caps, and plugs, as required in conjunction with testing. He shall also furnish a test pump, gauges and any other equipment required in conjunction with carrying on the hydrostatic tests. He shall at all times protect the new water mains and the existing water mains against the entrance of polluting material.

APPENDIX A

SCHEDULE OF RATES AND FEES